Digital Radiosonde RS92-SGP

USER'S GUIDE

M210295en-A
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VAISALA

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CHAPTER 1

GENERAL INFORMATION

About This Manual

This manual provides information for installing, operating, and maintaining the RS92 Digital Radiosonde.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides important safety, revision history, and warranty information for the product.
- Chapter 2, Product Overview, introduces the RS92 Digital Radiosonde features, advantages, and the product nomenclature.
- Chapter 3, Operation, contains information that is needed to operate this product.
- Chapter 4, Maintenance, provides information on the basic maintenance of the product.
- Chapter 5, Vaisala Helpdesk, and Return Instructions
- Appendix A, Safety Instructions for Balloon Operators.

Version Information

Table 1 Manual Revisions

Manual Code	Description
M210295en-A	This manual.

Related Manuals

Table 2 Related Manuals

Manual Code	Manual Name
M210299en	RS92 Analog Radiosonde User's Guide
M210329en	GC25 Ground Check Set User's Guide

Safety

General Safety Considerations

Throughout the manual, important safety considerations are highlighted as follows:

WARNING	Warning alerts you to a serious hazard. If you do not read and follow instructions very carefully at this point, there is a risk of injury or even death.

CAUTION	Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

NOTE	Note highlights important information on using the product.

Product Related Safety Precautions

The RS92 Digital Radiosonde delivered to you has been tested for safety and approved as shipped from the factory. Note the following precautions:

WARNING	Conduct soundings in a safe environment and in accordance with all applicable restrictions and regulations.

WARNING	Do not use the radiosonde in an area with power lines or other obstructions overhead. Make sure that you check the area for such obstructions before using.

WARNING	Do not use the radiosonde without consultation and cooperation with local and other applicable aviation authorities.

WARNING	Do not modify the unit in any way, except as instructed in the manual.

WARNING	Do not use the radiosonde for any purpose other than for soundings.

Warranty

For certain products Vaisala normally gives a limited one year warranty. Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or conditions of sale for details of the warranty for each product.

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CHAPTER 2

PRODUCT OVERVIEW

This chapter introduces the RS92 Digital Radiosonde features, advantages, and the product nomenclature.

Introduction to RS92 Digital Radiosonde

The RS92 Digital Radiosonde offers improved data availability, in the form of ccGPS windfinding, improved accuracy of humidity, pressure, temperature measurement. This new radiosonde type features code-correlating GPS (significant improvement of data availability, with the ability to calculate height from GPS data), a silicon pressure sensor and heated twin Humicap sensor. The RS92 Digital Radiosonde has a small and fast temperature sensor and features easy 'add sensor' capability. The RS92 radiosonde is available in digital and analog versions. The synthesizer based transmitter is stable and uses narrow bandwidth.

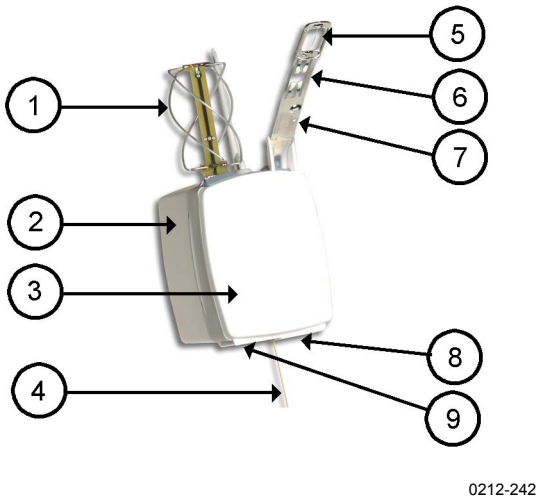

Figure 1 RS92 Digital Radiosonde

The following numbers refer to Figure 1 above:

1 = GPS antenna
2 = Battery housing
3 = RS92-SGP Digital Radiosonde
4 = Antenna
5 = Temperature sensor
6 = Humidity sensor
7 = Sensor boom
8 = GC25 interface
9 = Additional sensor interface

All RS92 family GPS windfinding models are based on code correlating GPS (ccGPS) receivers. Optimal performance is obtained by combining well-known, robust ccGPS receiver architecture with special features for radiosonde applications.

The RS92 Digital Radiosonde can be used with the new DigiCORA III (MW21) and the DigiCORA II system (MW11, 12, 15) using the UPP210 radio card with MWG card software update.

For up-to-date and detailed technical datasheet on the RS92-SGP Digital Radiosonde, visit the Vaisala website at www.vaisala.com.

CHAPTER 3

OPERATION

This chapter contains information that is needed to operate this product.

General Sounding Instructions

For a successful sounding, it is essential to carry out the pre-launch steps as instructed and always in the same way.

Before preparing the radiosonde, prepare the balloon and (if necessary) parachute or cardboard sheet and rigging. Details for proper and safe balloon preparation are provided in the following section.

Prepare the Balloon

The balloon and rigging (when necessary) must be prepared before the radiosonde. This is necessary, as the radiosonde must be launched within 15 minutes of battery activation.

WARNING	It is essential that you read the safety instructions in Appendix A on page 25 before proceeeding. Carefully study the instructions for use of the hydrogen generator and for the correct method of inflation.

1. Attach the balloon to the gas nozzle by securing the balloon with string or clamp.

2. Inflate the balloon in strict accordance to balloon manufacturer's correct inflation instructions. Do not leave the balloon filling shed while inflating.
3. Close the gas valve.

WARNING	Take extreme caution when handling the inflated balloon!

4. Tightly secure the neck of the balloon with a string before removing the balloon from the gas nozzle.
5. Fold the neck over double and secure firmly. Tie the string higher up to ensure the unwinder can easily fit. Note that the unwinder hook must come out the other side, as shown in Figure 2 below.

Figure 2 Attaching the Balloon

NOTE	Be careful to attach the balloon correctly. This is the only correct method to attach the balloon to unwinder.

The purpose of the unwinder is to unwind the suspension string gently and slowly. For this to be possible, the unwinder must be attached firmly to prevent its movement relative to the balloon. If the unwinder were allowed to move about freely, the suspension string would unwind too quickly and the radiosonde might hit the ground upon launch.

If you cannot attach the radiosonde with the unwinder to the balloon as instructed – for instance when using a radar reflector – attach the unwinder with string to a distance of about 10 cm from the reflector and the reflector to a distance of approximately 50 cm from the balloon, see Figure 3 on page 12 for further information.

NOTE The RS92 Digital Radiosonde can be disturbed by strong high-frequency transmitters of various kinds, such as aerial surveillance radars and mobile phones. For example, mobile phones should not be taken closer than 10 meters to the radiosonde.

NOTE The RS92 Digital Radiosonde should not be closer than at a distance of 3 m to another radiosonde. This requirement should be kept in mind especially when performing dual soundings.

Unpacking the Radiosonde

1. Tear open the foil bag as indicated.
2. Remove the rubber-band and lift the cardboard flap protecting the sensor boom. Be careful to avoid touching or hitting the sensors on the sensor boom from here on.
3. Remove the radiosonde from the package, free the antenna, and take the unwinder out of the package with the radiosonde.

CAUTION Do not touch or hit the sensors on the sensor boom. Also be careful not to bend the GPS antenna. By carefully handling the radiosonde and the sensor boom, as well as the GPS antenna, you will ensure proper functioning of the radiosonde during sounding.

Sounding with DigiCORA III MW21

When using RS92-SGP Digital Radiosonde with DigiCORA III, no tape reader is necessary. For example, the RS92 Digital Radiosonde coefficients are automatically given to DigiCORA III via telemetry.

Sounding Preparations

For details on using the GC25 Ground Check Set, refer to the GC25 Ground Check Set User's Guide. See Related Manuals on page 4 for details.

1. Switch on the PC and start a new sounding with the DigiCORA III software. For details refer to the DigiCORA III User's Guide.
2. Make sure the GC25 is switched on.

3. Set the radiosonde into the GC25 as shown in Figure 4 below, for detailed instructions on conducting a ground check see section Operation in the GC25 Ground Check Unit User's Guide, refer to Related Manuals on page 4.

0212-244

Figure 4 RS92 Digital Radiosonde in GC25 Ground Check Unit

4. Find the radiosonde frequency using DigiCORA III. For further information, refer to the DigiCORA III User's Guide, refer to Related Manuals on page 4.
5. Remove the radiosonde from the GC25 as instructed. Be careful not to touch or hit the sensor boom.
6. Using your index fingers, pull the clips apart as indicated by the arrows in Figure 5 on page 15, and bend the sensor boom forward into flight position with your thumb.

CAUTION	When handling the sensor boom, be careful not to touch or hit the sensors. When pressing the sensor boom into flight position, only touch the bottom of the boom so as to not contaminate the surface. See Figure 5 on page 15 for an illustration.

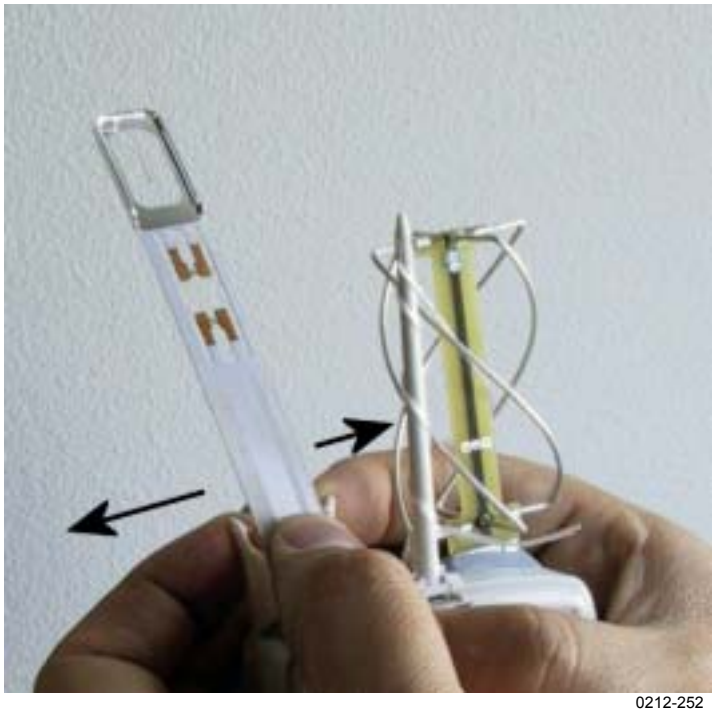

Figure 5 Placing the Sensor Boom into Flight Position

The radiosonde is now ready for battery activation, refer to section Activate the Battery on page 16.

Sounding with DigiCORA II MW11, MW12, and MW15

When using RS92-SGP Digital Radiosonde with DigiCORA I - II, no tape reader is necessary. For example, the RS92 Digital Radiosonde coefficients are automatically given to the ground equipment via telemetry.

Sounding Preparations

For details on using the GC25 Ground Check Set, refer to the GC25 Ground Check Set User's Guide. See Related Manuals on page 4 for details.

1. Switch on MW15 (MW11 or MW12) and start a new SOND program with the DigiCORA I - II software. For details refer to appropriate User's Guide.
2. Make sure the GC25 is switched on.

3. Set the radiosonde into the GC25 as shown in Figure 4 on page 14. For detailed instructions, refer to the GC25 Ground Check Unit User's Guide.
4. Find the radiosonde frequency using DigiCORA I - II. For further information, refer to the appropriate DigiCORA User's Guide.
5. When the proper frequency has been found, the coefficients will be read automatically via telemetry. Wait until the coefficients transfer is completed. For detailed instructions on conducting a ground check see section Operation in the GC25 Ground Check Unit User's Guide, refer to Related Manuals on page 4.
6. Remove the radiosonde from the GC25 and bend the sensor boom forward into flight position by pressing the sensor boom into the clip, as shown in Figure 5 on page 15.

CAUTION	When handling the sensor boom, be careful not to touch or hit the sensors. When pressing the sensor boom into flight position, only touch the bottom of the boom so as to not contaminate the surface.

The radiosonde is now ready for battery activation, refer to section Activate the Battery below.

Activate the Battery

1. Open the battery wrapping with scissors.
2. Dip the battery in water for four minutes. Use fresh tap water, with a temperature of 15 to 25 °C.
3. The battery will be ready for use after 4 minutes of immersion. Do not press water out of the battery.
4. Connect the battery connector. Make sure the red wire is connected to the side marked with the text "RED".

CAUTION	Make sure to observe the correct polarity when connecting the battery to the radiosonde power cord. Reversing the polarity can render the radiosonde inoperable.

5. Re-insert the battery into its receptacle with the wax end down. Close the battery cover.

NOTE	One end of the battery is waxed to prevent leakage. Therefore, the battery should be inserted with the waxed end down.

NOTE	You now have 15 minutes for handling the radiosonde before launch.

The radiosonde is now prepared for launch. Attach the radiosonde unwinder to the balloon as explained in section Prepare the Balloon on page 9.

Launch the Radiosonde

When launching the radiosonde, proceed as follows:

1. To launch the RS92 Digital Radiosonde, hold the unwinder so that the string cannot begin to run out before release.

NOTE	When releasing the radiosonde, keep the string length between the radiosonde and the unwinder as short as possible.

2. Immediately after the launch, check the reception of the radiosonde frequency on the receiver. Correct the tuning if necessary.
3. The radiosonde should be launched within **15 minutes** from the battery activation. A setup with a radar reflector between the balloon and the unwinder should be prepared as far as possible before activating the battery.
4. The preparation and setup procedures for special sensor soundings with RS92 Digital Radiosonde can be found in the appropriate manuals.

Ground Equipment

At this stage the ground equipment will ask you for surface observation information. Please refer to your sounding equipment manuals for further details on monitoring the sounding and receiving/viewing sounding data.

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CHAPTER 4

MAINTENANCE

This chapter provides information on the basic maintenance of the product.

Storage

The radiosondes must be stored and used properly in accordance with applicable instructions, the User's Manual, and specifications issued by Vaisala.

Proper storage conditions must fulfill the following requirements: Radiosondes are to be kept in their original packaging (unopened vacuum envelopes) in a dry, ventilated indoor storage space, and within the following key environmental limits (ref. IEC 721-3-3 class 3K3):

- Constant temperature, within the range of +5 to +40 °C
- Constant humidity below 85 % RH

Handling

Vaisala radiosondes must be transported in their original shipping packings. These packings are designed and built to survive and protect their contents in the environmental conditions described herein with the terminology and definitions per standard: IEC 60721-3-2, Transportation of radiosondes requires climatic conditions 2K2 and mechanical conditions class 2M1 of this standard:

- Transportation in weather protected conditions.

- Using conventional means (car, truck, and/or aircraft), with free fall not exceeding 0.25 m in any circumstance.
- Additional markings on packing must be followed.

CHAPTER 5

VAISALA HELPDESK

Getting Help

For technical questions or assistance, contact Vaisala technical support:

E-mail	helpdesk@vaisala.com
Telephone	+358 9 8949 2789
Fax	+358 9 8949 2790

Return Instructions

If the product needs repair, please follow the instructions below to speed up the process and avoid extra costs.

1. Read the warranty information.
2. Write a Problem Report with the name and contact information of a technically competent person who can provide further information on the problem.
3. On the Problem Report, please explain:
   - What failed (what worked / did not work)?
   - Where did it fail (location and environment)?
   - When did it fail (date, immediately / after a while / periodically / randomly)?
   - How many failed (only one defect / other same or similar defects / several failures in one unit)?
   - What was connected to the product and to which connectors?

- Input power source type, voltage and list of other items (lighting, heaters, motors etc.) that were connected to the same power output.
- What was done when the failure was noticed?

4. Include a detailed return address with your preferred shipping method on the Problem Report.
5. Pack the faulty product using an ESD protection bag of good quality with proper cushioning material in a strong box of adequate size. Please include the Problem Report in the same box.
6. Send the box to:
   Vaisala Oyj
   Contact person / Division
   Vanha Nurmijärventie 21
   FIN-01670 Vantaa
   Finland

Radiosonde Failure Report

To be sent to Vaisala HelpDesk, contact information below.

Filled by	Station	Date

Sounding Equipment

Ground Equipment	Status Report printout attached	☐ pages
Wind Processor	Raw Data disks included	☐ pcs
Antenna	METGRAPH/EDT data included	☐ pcs
Receiver	Config List printout attached	☐ pages
PTU Processor	Additional printouts/material	☐ pages
Sounding Program Revision Number (from printout):	Sonde returned	

Weather at Launch

Present Weather	ww =		☐ No precipitation	☐ Fog	☐ Drizzle	☐ Rain	
			☐ Heavy Rain	☐ Snow	☐ Freezing	☐ Thunder	
Clouds	group =		☐ Clear sky	☐ Low clouds	☐ High clouds		
Temperature	°C	Relative Humidity	%	Wind Speed	m/s		

Sounding

Radiosonde	Type	Serial Number		☐ Parachute	☐ Radar Reflector	
Ground check	P Correction	hPa;	T Correction	°C	U Correction	% RH
Sounding preparations	Approximative time from battery activation to balloon launch					min
Balloon	Type	Size	g	Nozzle lift		g

Failure Description

Reason	☐ Material	☐ GC failure	☐ Failure during sounding	☐ Other reason (describe below)	
Sounding data at failure	Time from start	min;	P	hPa;	T °C; U % RH
Ground equipment display error code					
Loudspeaker sound	☐ Silence	☐ Noise	☐ Noisy signal	☐ Clear signal	
Field strength	☐ 1 (weak)	☐ 2	☐ 3	☐ 4	☐ 5 (strong)
Detailed Failure Description					
				☐ Continues on additional paper	

Customer Contact Information

Customer	Contact Person
Postal Address	Phone
	Fax
	E-mail
	I want to be informed about the case progress by:

Complaint Sent to Vaisala HelpDesk By

E-mail	☐ Helpdesk@Vaisala.com
Telefax	☐ +358-9-8949 2790
Post	☐ Vaisala Oyj HelpDesk, P.O. Box 26, FIN-00421 Helsinki, Finland

Date	Vaisala Contact Person

Filled in By Vaisala HelpDesk

Received by	Date

Related HelpDesk Case Number	Notes

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APPENDIX A

SAFETY INSTRUCTIONS FOR BALLOON OPERATORS

The safety instructions for radiosonde operators are provided on the following page for your convenience. Photocopy the instructions and place the list into clear view in the balloon filling shed and in the sounding compartment.

To be placed into view in the balloon filling shed and in the sounding compartment.

1. No smoking or naked flame is allowed.
2. If possible, avoid wearing clothing of nylon or other synthetic fabric to avoid buildup of static charges. Do not use shoes with rubber soles.
3. Wear protective glasses.
4. Regularly check the gas tube for secure fit to the gas cylinder or generator nozzle and to the balloon inflation nozzle.
5. Prevent gas leakage in the shed when interrupting inflation to replace gas cylinder.
6. Never use a mended balloon.
7. Should a leak develop in the balloon during inflation, do not let off gas from the balloon in the shed. Instead, release the defective balloon without load. It is not advisable to deflate the balloon even outside near the shed.
8. Do not touch the balloon with bare hands except when holding it by the neck. Use gloves of soft cotton.
9. Ensure that there are no pointed objects in the shed. Nails, hooks, hinges, padlocks, etc., are dangerous as they might scratch the inflated balloon. The balloon film is only 0.05-0.1 mm thick upon launch; the slightest scratch could cause premature or even immediate burst in the shed.
10. Keep the doors of the shed shut while inflating the balloon on a windy day. However, ensure that the shed is properly ventilated.
11. No outside person shall be allowed admittance to the shed while the hydrogen generator is in operation or balloon inflation is going on.
12. Ensure that all tools and other implements not essential for balloon inflation have been removed from the shed.

WARNING	New operator! Carefully study the instructions for use of the hydrogen generator and for the correct method of inflation.